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19. (amended) The method according to Claim 13 wherein the long-term energy averaging circuit integrates electrical signals having a power spectrum which does not significantly change over time and the short-term energy averaging circuit integrates signals [which do have] <u>having</u> a power spectrum [which changes] <u>that does change</u> over time.

<u>REMARKS</u>

This is a response to the Examiner's Office Action dated February 22, 1994. A request for a one month extension of time is being filed concurrently herewith.

Claims 1-19 are pending in this application. Of those claims, claim 17 stands rejected under 35 U.S.C. § 112, second paragraph as being indefinite for the reason stated on page 2 of the Examiner's Office Action. Claims 1, 4-15, 18 and 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Williams, III et al. Additionally, claims 2, 3, 16 and 17 stand rejected under 35 U.S.C. § 103 as being unpatentable over Williams, III et al. in view of Ishida et al.

In view of the preceding amendments and the following remarks, the above rejections are traversed and reconsideration of this application is respectfully requested.

By the above amendment, claim 17 now depends from claim 16. Therefore, the language "the channels" has proper antecedent basis. It is therefore respectfully requested that the § 112, second paragraph be withdrawn.

Applicants' invention is directed towards an amplifying circuit that is adaptable in one respect to be used in association with a hearing aid device. The amplifying circuit includes a variable gain amplifier whose gain is controlled by a long-term energy averaging circuit and a short-term energy averaging circuit. The long-term energy averaging circuit integrates steady state signals associated with an input signal applied to the amplifying circuit, and reduces the gain of the variable gain amplifier in response to the steady state signal. The short-term energy averaging circuit integrates short term or novel signals in the input signal, and increases the gain of the amplifier in response to the novel signals. In this manner, the amplifying circuit will reduce its output intensity when it is receiving steady state background noise, and will increase its output intensity upon the occurrence of a novel event which may be of interest.

U.S. Patent No. 4,771,472 issued to Williams, III et al. discloses a microphone circuit that improves voice intelligibility in a high noise environment. As discussed in Williams, III et al., during normal level speech, plosive and fricative phonemes have less acoustical energy than other phonemes, such as vowel sounds. However, under high ambient noise conditions (greater than 100dBA), a person will speak louder than normal. If the person is speaking into a microphone, the person will not only speak louder into the microphone under high ambient noise conditions, but will also move very close to the microphone. As the person moves close to the microphone, the air that is released from the person's mouth during plosive

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phonemes causes the microphone element to vibrate. This causes the electrical output of the microphone during the vibrations to be higher than the non-plosive sounds such as the vowel sounds. The plosive phonemes that are processed through the electrical system of a microphone in high ambient noise level conditions can exceed the dynamic range of the electrical system of the microphone, and thus make it difficult for a listener to distinguish between the different plosive phonemes.

In order to make the output sounds of the microphone under high ambient noise conditions intelligible, Williams, III et al. propose a circuit that separates and attenuates the background noise and the plosive phonemes received by a microphone 10. The electrical signal from the microphone 10 is first applied to an attenuation circuit 16, and then to each of a slow automatic gain control (AGC) circuit 22 and a fast automatic gain control circuit 24. The slow AGC circuit 22 is an integration circuit that has a threshold and time constant to provide attenuation of the signal related to the long-term average of the background noise entering the microphone 10. In other words, the slow AGC circuit 22 has a time constant that is much greater than the variations of speech in order to provide general suppression of background noise and vowel phonemes such that the overall amplitude of the microphone signal remains relatively constant (col. 6, lines 58-66 and col. 7, lines 53-58).

The fast AGC circuit 24 has a short time constant (30-100ms) to provide attenuation of the higher level plosive sounds. The fast AGC circuit 24 allows the leading edge or beginning portion of a plosive sound to pass through the electrical system

normally, but increasingly attenuates the plosive sounds as they continue to pass through the circuit 24 (col. 7, lines 23-45). In order to enable the fast AGC circuit 24 to discriminate between the plosive sounds and the other phonemes such as the vowels, the fast AGC circuit 24 has a significantly higher threshold than the slow AGC circuit 22. Therefore, the fast AGC circuit 24 will operate only on the higher amplitude portions of the signal from the microphone 10 and the slow AGC circuit 22 will operate on the broadband background noise through a much broader range of sound (col. 7, lines 46-58). Both of the slow and fast AGC circuits 22 and 24 are simple linear AGC circuits that maintain a constant output level.

The output attenuation signals from the slow AGC circuit 22 and the fast AGC circuit 24 are applied to a summing and isolating circuit 26 in order to combine the signals from the slow and fast AGC circuits 22 and 24. An output of the summing and isolating circuit 26 controls the attenuation level of the attenuator 16. In this manner, the attenuator 16 attenuates the plosive phonemes and the background noise signals from the microphone 10 in a different manner, so as to consider the different types of sound.

As is apparent form the above discussion and a careful review of Williams, III et al., the Williams, III et al. circuit is a circuit that <u>only</u> attenuates electrical signals from a microphone in high ambient noise conditions. Both the slow and fast AGC circuits 22 and 24 apply output signals to the attenuator 16 so as to decrease the level of the signal from the microphone 16 as applied to the attenuator 16. The Williams, III

et al. circuit does not reduce the level of undesirable signals and <u>increase</u> the level of desirable signals as defined in Applicants' claimed invention.

Applicants' claimed invention includes a short-term energy averaging circuit and a long-term averaging circuit. The long-term energy averaging circuit integrates steady state signals that represent undesirable background signals so as to reduce the gain of an amplifier, and thus the background signals. The short-term energy averaging circuit integrates non-steady state signals so as to <u>increase</u> the gain of the amplifier for desirable signals. A careful review of Williams, III et al. will show that the circuit attenuates (decreases) both the background noise signals and the desirable signals received by the microphone 10. The output signals from both the slow and fast AGC circuits 22 and 24 are applied to an attenuator, not an amplifier. Nowhere in Williams, III et al. does it describe increasing the output of an amplifier in the event of a particular sound.

On pages 2 and 3 of the Office Action, the Examiner has indicated that reference numerals 16 and 36 represent a variable gain amplifier. Reference numeral 16 represents, however, an attenuator that attenuates a signal, it does not amplify a signal. Reference numeral 36 represents an attenuating field effect transistor, and is also not an amplifier. The Examiner has also referred to reference numerals 50 and 52 as being a difference amplifier. Amplifier 50 is a slow AGC amplifier and amplifier 52 is a fast AGC amplifier. These amplifiers are part of the slow and fast AGC circuits discussed above, and therefore, cannot be a difference amplifier of the type claimed by

Applicants. Further, reference numerals 90 and 91 refer to feedback capacitors associated with the slow and fast AGC circuit, respectively. None of these individual components specifically referred to by the Examiner are of the same type as claimed by Applicants.

From a careful review of Williams, III et al. and the discussion above, it becomes clear that the circuit disclosed in Williams, III et al. is very distinct than that of Applicants' claimed invention. There is no suggestion, teaching or motivation anywhere in Williams, III et al. that would lead an artisan to a circuit that reduced the gain of an amplifier when the amplifier was receiving a steady state signal, and increased the gain of the amplifier when the amplifier was receiving a non-steady state signal. Consequently, Williams, III et al. cannot make Applicants' claimed invention obvious without a supplemental teaching of the type discussed above.

U.S. Patent No. 5,067,157 issued to Ishida et al. discloses a noise reduction apparatus for an FM stereo tuner. It appears that the Examiner is relying upon Ishida et al. to teach a plurality of amplification channels and a summing amplifier. Applicants have reviewed Ishida et al. and can find no indication in this patent that would suggest or teach an amplifying circuit that included a short-term energy averaging circuit and a long-term energy averaging circuit in which the long-term energy averaging circuit integrated steady state signals so as to reduce the gain of a variable gain amplifier, and the short-term energy averaging circuit integrated non-steady state signals so as to increase the gain of the variable gain amplifier in order to

reduce background noise and increase desirable signal levels in the amplifier. Consequently, Ishida et al. does not provide the teaching that is missing from Williams, III et al. to arrive at Applicants' claimed invention. It is therefore respectfully requested that the § 103 rejection be withdrawn.

In view of the preceding amendments and remarks, it is believed that this application is in condition for allowance. If the Examiner has any questions or comments that would expedite prosecution of this application, he is invited to call the undersigned at his earliest convenience.

Respectfully submitted,

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